

FIRST RECORD OF THE GENUS *PARABELBELLA* BULANOVA-ZACHVATKINA (ORIBATIDA, DAMAEIDAE) FROM CHINA, WITH DESCRIPTION OF A NEW SPECIES

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Abstract The genus *Parabelbella* Bulanova-Zachvatkina, 1967 is reported for the first time with a new species *P. dimidiaspina* sp. nov. from Beishan National Forest Park, Huzhu County, Xining, Qinghai Province, China. All specimens examined are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

Key words Oribatida, Damacidae, *Parabelbella*, new species, new record, China.

1 Introduction

The genus *Parabelbella* is one of the most poorly known genera in the oribatid mite family Damacidae. Miko *et al.* (2011) combined five known species into this genus: *P. flagellata* (Balogh *et al.* Mahunka, 1969) (Miko *et al.*, 2011), *P. golosovae* (Lyashchew *et al.* Tolstikov, 1993) (Miko *et al.*, 2011), *P. inaequipes* (Banks, 1947) (Miko *et al.*, 2011), *P. longiseta* (Banks, 1906) (Miko *et al.*, 2011) and *P. meridiana* (Norton, 1979) (Miko *et al.*, 2011). Plus *P. crenatosetosa* Bulanova-Zachvatkina, 1967 and *P. elisabethae* Bulanova-Zachvatkina, 1967. Up to now, only 7 known species of the genus has been reported all over the world but not China (Chen *et al.*, 2010). During checking our collection of Oribatid mites from China, a new species was found.

2 Material and Methods

Measurements and descriptions are based on specimens mounted in temporary cavity slides that were studied using a standard light microscope (OLYMPUS PM-10AD) equipped with plotting instrument. Body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral length was also measured in lateral view, from anterior to posterior edge; notogastral width refers to the maximum width in dorsal aspect. Length of body setae was measured in lateral aspect. All measurements are presented in micrometers. In figures we used the following abbreviations: prodorsal and sejugal apophyses (*Ba*, *Bp*), lateral apophyses (*Sa*, *Sp*) and coxisternal apophyses (*E2a*, *E2p*, *Va*, *Vp*), discidium (*di*),

prodorsal setae (*ro*, *le*, *in*, *ex*), sensillus (*ss*), notogastral or gastronotal setae (*c*, *l*, *h*, *p*-series), adanal and anal setae (*ad*, *an*-series), aggenital setae (*ag*), coxisternal setae (*1a*, *1b*, *1c*, *2a*, *3a*, *3b*, *3c*, *4a*, *4b*, *4c*, *4d*). The morphological terminology used is mostly that developed over many years by Grandjean (1952, 1960). The nomenclature of leg setation refers to Norton (1977).

3 Taxonomy

Parabelbella Bulanova-Zachvatkina, 1967

Type species. *Parabelbella crenatosetosa* Bulanova-Zachvatkina, 1967.

Synonyms. *Epidamaeus* (*Akrodamaeus*) Norton, 1987.

Diagnosis. All tibial solenidia free, tibial seta *d* lost, genua I – III with seta *d* and solenidion coupled, and with typical damaeid leg setation (usually trochanters 1-1-2-1, femora 7-6-4-4, genua 4-4-3-3, tibia 4-4-3-3 and tarsi 20-17-17-14). Spinae adnatae absent, propodolateral apophysis present or absent. One pair of distinct prodorsal tubercles present (*Ba*). Sensillus flagellate, usually long, smooth or with fine, very short barbs. Parabothridial apophyses unequally developed, *Sa* longer and sharp, *Sp* smaller and usually triangular. Ventral tubercle *Va* well developed, triangular or tooth-like; other tubercles (*Vp*, *E2a*, *E2p*) usually developed as distinct tubercles or ridges, rarely with some absent (Miko *et al.*, 2011).

Distribution. Russia, Central Asia and America.

Parabelbella dimidiaspina sp. nov. (Figs 1 – 13)

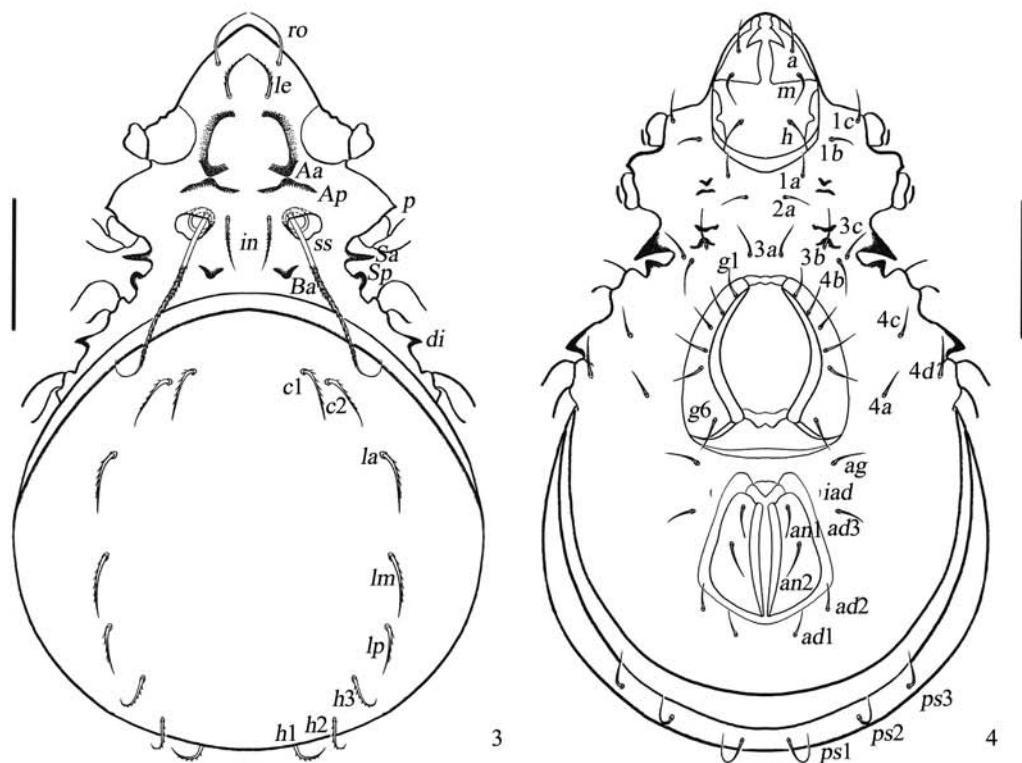
Diagnosis. Postbothridial tubercle *Ba* present; tubercles *Da*, *Dp* and *Bp* absent; Sensillus (*ss*) moderate

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Figs 1–2. *Parabellella dimidiaspina* sp. nov. 1. Dorsal view. 2. Ventral view. Scale bars = 100 μm .



Figs 3–4. *Parabellella dimidiaspina* sp. nov. 3. Dorsal view, only base of legs illustrated. 4. Ventral view, only base of legs illustrated. Scale bars = 100 μm .

long, thin, flagelliform, median portion to distally with dense barbs. Interlamellar setae (*in*) moderate long, with conspicuous barbed, directed to

posterolaterad. Comparatively length: *ex* < *in* < *ro* < *le* < *ss*. Transverse ridge present between the base of pairs of rostral setae (*ro*). Circular in dorsal view.

Notogastral setae moderate long, unilaterally with slightly denticulate edge; ventral tubercles *E2*, *V* present; *E2a* and *Vp* well developed; *E2p* and *Va* weakly developed; *Sa*, *Sp* and *di* well developed, triangular. Setal formula of epimerata: 3-1-3-4. Hypostomal setae *a*, *m* and *h* short, all of them thin and smooth; genitoaggenital plate larger than anoadanal plate; solenidia δ of genus I - III shorter and slender than their associated setae *d*; solenidion φ of tibia II with associated seta *d*, solenidion φ of tibia I, III and IV without their associated setae *d*.

Dimensions (Figs 1 - 2). Body length 530; prodorsum: length 180, width 170, height 165, setae: *ss* 175, *in* 60, *le* 70, *ro* 65, *ex* 37, distance between setae: *ro-ro* 65, *in-in* 52, *le-le* 50, *in-le* 115, *le-ro* 60; notogaster: length 350, width 360, height 330; setae: *cl* 60, *c2* 60, *la* 60, *lm* 60, *lp* 60, *h3* 50, *h2* 50, *h1* 50, *ps1* 45, *ps2* 40, *ps3* 42; distance between setae: *cl-cl* 70, *c2-c2* 105, *la-la* 175, *lm-lm* 190; ventral region: genitoaggenital plate 235 \times 218, anoadanal plate 196 \times 185. Paratypes (*n* = 5). Prodorsum: length 175 - 180, width 170 - 175, height 165 - 168; notogaster: length 345 - 350, width 360 - 365, height 330 - 335; ventral region: genitoaggenital plate 232 - 235 \times 105 - 108, anoadanal plate 160 - 162 \times 70 - 72.

Integument. Yellowish-brown in color. Surface of dorsal and ventral plates of body and leg segments with very thick cerotegument. Conspicuously microtuberculate on all enantiophyses, lateral part of podosoma and around leg acetabula. Notogaster with exuvial scalps and much adherent debris; leg segments with loosely attached adherent debris.

Prodorsum (Fig. 3). Rostrum rounded in dorsal view. Rostral setae (*ro*) smooth, thin; lamellar setae (*le*) slightly longer and thicker than rostral setae, heavily barbed unilaterally. Interlamellar setae (*in*) moderate long, heavily barbed; exobothridial setae (*ex*) smooth, slender, much shorter than the former setae, finer curved. Sensillus (*ss*) moderate long, thin, flagelliform, distal half with dense barbs, directed dorsolaterad. Comparative length: *ex* < *in* < *le* < *ro* < *ss*. Bothridium funnel-shaped, with large opening, directed posterolaterad. Prodorsal tubercles *Aa* and *Ap* well developed. Postbothridial tubercles *Ba* well developed, situated posterior to each bothridium; *Bp* and dorsosejugal tubercles *Da*, *Dp* absent. Propodolateral apophyses weakly developed. Anterolateral region of prodorsum (mediad of each acetabulum I) with a number of small tubercles. A few microtubercles found on the prodorsum, situated between postbothridial tubercles *Ba*.

Notogaster (Fig. 3). With exuvial scalps, loosely attached adherent debris, and numerous muscle sigillae present along lateral and posterolateral margins of notogaster. Notogastral setae *c*-, *l*- and *h*-

series moderate long, thin, unilaterally barbed. Setae *c* and *l* series equal in length, *h* series equal in length and shorter than former series. Posterior setae shorter than the others, with weakly barbed. Comparative length: *ps2* < *ps3* < *ps1* < *h1* = *h2* = *h3* < *lp* = *lm* = *la* = *cl* = *c2*. All notogastral setae directed posterolaterad.

Gnathosoma (Figs 4, 13). Infracapitular mentum wider than long, with noticeable microtubercles. Hypostomal setae *a*, *m* and *h* short, all of them thin and smooth. Chelicerae about 137 μ m in length; fixed and movable digits each with three blunt teeth. Setae *cha* smooth, *chb* conspicuously barbed; palp (Fig. 13) slender, normal for genus, 106 μ m in length. Palpal setation: 0-2-1-3-8, including solenidion *w*.

Epimeral and anogenital regions (Fig. 4). Tectum of podocephalic fossa not projecting, but slightly rounded under trochanter I. Ventral tubercles *E2*, *V* present; *E2a* and *Vp* well developed; *E2p* and *Va* weakly developed; parastigmatic tubercles *Sa* and *Sp* well developed, triangular, sharply at tip; discidium *di* triangular, sharply at tip and projecting laterally. Numerous small tubercles present on the epimeral regions. Setal formula of epimerata: 3-1-3-4. Genitoaggenital plate larger than anoadanal plate. All anogenital setae smooth. Adanal lyrifissures *iad* situated obliquely, at the level a little anterior to anal setae *an2*.

Legs (Figs 5 - 12). All leg segments with rough adherent debris. Relative lengths (I - IV) 1.00: 0.80 : 0.83: 1.10. All legs short, leg IV 0.62 ventral body length. Femur IV equivalent length of trochanter IV, bulb 10 times length of proximal stalk. Leg solenidia δ of genus I - III shorter and slender than their associated setae *d*; solenidion φ of tibia II with its associated seta *d*, solenidion φ of tibia I, III and IV without their associated setae *d*. Solenidion $\varphi 1$ on tibial of leg I flagelliform, 3 times as long as $\varphi 2$. Setae *d* on femora I - IV thick, darkly pigmented, mostly finely barbed. Setal formulas of legs (famulus and solenidion included): I: 1-7-4 (1) -4 (2) -20 (2); II: 1-6-4 (1) -3 (1) -16 (2); III: 2-5-3 (1) -4 (1) -15 (0); IV: 1-4-3 (0) -3 (1) -14 (0).

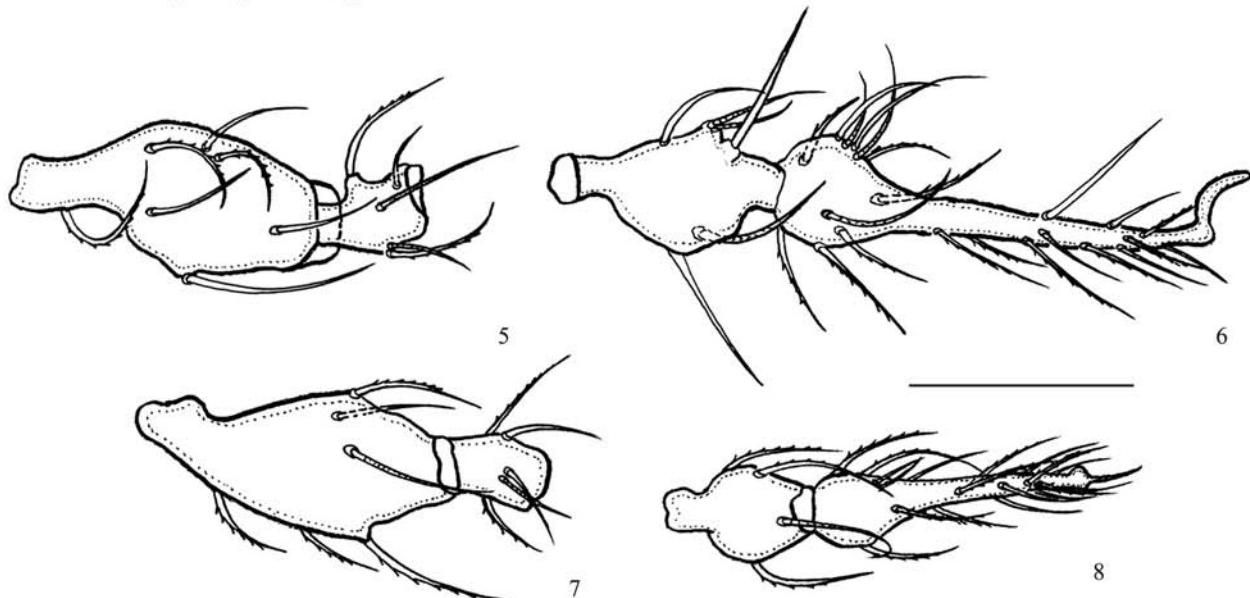
Holotype adult (in alcohol, QHHZ-XLX-8-17), China, Qinghai Province, Xining, Huzhu County, Beishan Forest Park (37° 06' N, 102° 14' E; alt. 3 075 m), from leaf litter underneath birch, 17 Aug. 2009, coll. XIE Li-Xia. Paratypes 5 adults (in alcohol, QHHZ-XLX-8-17), same data as holotype.

Etymology. The specific epithet “*dimidiaspina*” refers to the distal half of sensillus (*ss*) with dense barbs in the new species.

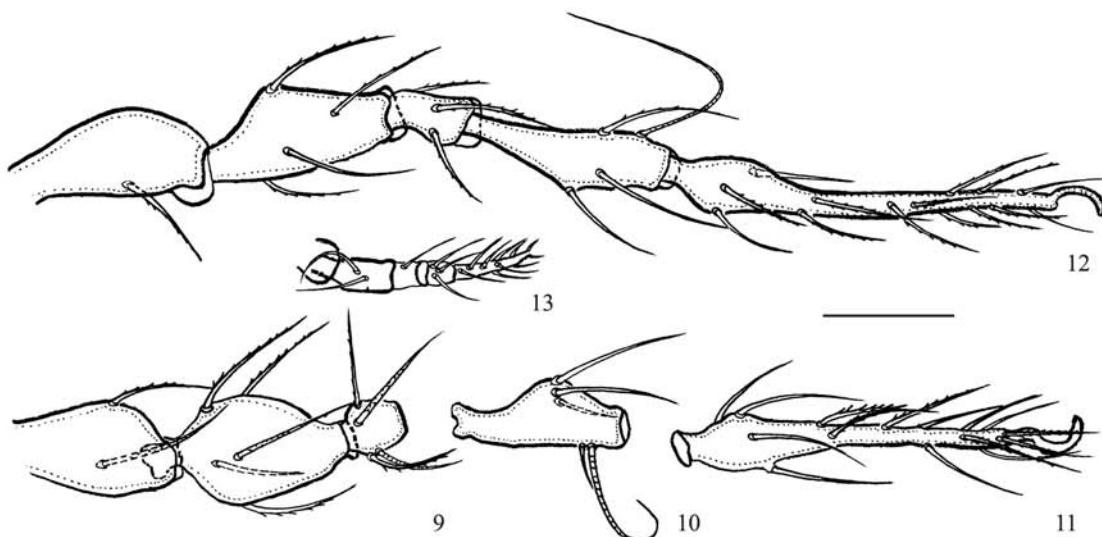
Remarks. The present species resembles *P. crenatosetosa* with the short and unilaterally barbed

notogastral setae, parastigmatic tubercles *Sa*, *Sp* and interlamellar setae (*in*). However, the new species differs from the latter by following characters: in *Parabelbella dimidiaspina* sp. nov., prodorsal tubercles *Aa*

and *Ap* present, the distal half of sensillus (*ss*) with dense barbs; in *P. crenatosetosa*, prodorsal tubercles *Aa* and *Ap* absent, sensillus (*ss*) barbed from base to tip.



Figs 5–8. *Parabelbella dimidiaspina* sp. nov. 5. Femur, genu I. 6. Tibia, tarsus I. 7. Femur, genu II. 8. Tibia, tarsus II. Scale bars = 100 μm .



Figs 9–13. *Parabelbella dimidiaspina* sp. nov. 9. Trochanter, femur and genu III. 10. Tibia III. 11. Tarsus III. 12. Leg IV. 13. Palp. Scale bars = 100 μm .

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REFERENCES

- Balogh, J. and Mahunka, S. 1969. The zoological results of the Hungarian Soil Zoological Expeditions to South America 11. Acari: oribatids from the material of the second expedition, II. *Opuscula Zoologica Budapest*, IX (1): 31–69.
- Banks, N. 1906. New Oribatidae from the United States. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 58

- (3): 490–500.
- Banks, N. 1947. On some Acarina from North Carolina. *Psyche*, 54: 110–141.
- Bulanova-Zachvatkina, E. M. 1967. *Pantsirnye Kleshchi-Oribatidy*. Vysshaya Shkola, Moskva. 254 pp.
- Chen, J., Liu, D and Wang, H-F 2010. Oribatid mites of China: a review of progress, with a checklist. In: Zhang, Z-Q, Hong, X-Y and Fan, Q-H (eds.), LIU Xin-Jie Centenary: Progress in Chinese Acarology. Zoosymposia 4. Magnolia Press. 1–199.
- Grandjean, F. 1952. Au sujet de l'ectosquelette du podosoma chez les Oribates supérieurs et de sa terminologie. *Bulletin de la Société Zoologique de France*, 77: 13–36.
- Grandjean, F. 1960. *Damaeus arvernensis* sp. nov. (Oribate). *Acarologia*, 2: 250–275.
- Lyashchev, A. A. and Tolstikov, A. V. 1993. *Epidamaeus* (*Akrodamaeus*) *golosovae* sp. nov. a new representative of oribatid mites (Acariformes, Oribatei) from Central Asia. *Zoologicheskiy Zhurnal*, 72 (1): 153–157.
- Norton, R. A. 1977. A review of F. Grandjean's system of leg chaetotaxy in the Oribatei (Acari) and its application to the family Damacidae. In: Dindal, D. L. (ed.), Biology of Oribatid Mites. SUNY College of Environmental Science and Forestry, Syracuse, New York. 33–61.
- Norton, R. A. 1979. Generic concepts in the Damacidae (Acari: Oribatei) I. Three new taxa based on species of Nathan Banks. *Acarologia*, 20: 603–622.
- Miko, L., Ermilov, S. G. and Smelyansky, I. E. 2011. Taxonomy of European Damacidae (Acari: Oribatida) VI. The oribatid mite genus *Parabelbella*: Redescription of *P. elisabethae* and synonymy of *Akrodamaeus*. *Zootaxa*, 3140: 38–48.

珠甲螨科中国一新纪录属——旁珠足甲螨属（蜱螨亚纲，甲螨亚目，珠甲螨总科）

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摘要 记述采自青海省西宁市互助北山国家森林公园的中国1新纪录属, 旁珠足甲螨属 *Parabelbella* Bulanova-Zachvatkina, 1967, 及1新种, 半刺旁珠足甲螨 *Parabelbella dimidiaspina* sp. nov.。模式标本保存在贵州大学昆虫研究所。

半刺旁珠足甲螨, 新种 *Parabelbella dimidiaspina* sp. nov.

新种相似于锯毛旁珠足甲螨 *Parabelbella crenatosetosa*, 都具有短而单侧具刺刚毛, 感器窝侧突 (*Sa*)、(*Sp*) 及梁间毛 (*in*)。新种具前背板凸起 (*Aa*) 和 (*Ap*), 假气门器 (*ss*) 中端密被微刺; 而锯毛旁珠足甲螨 *Parabelbella crenatosetosa* 以不具有前背板凸起 (*Aa*) 和 (*Ap*), 假气门器 (*ss*) 整个部位

关键词 甲螨亚目, 珠甲螨科, 旁珠足甲螨属, 新种, 新纪录, 中国。

中图分类号 Q959.226

密被微刺的特征区别于新种。

检视标本: 正模1头 (75% 酒精浸泡, QHHZBS-XLX-8-17), 青海西宁互助北山森林公园 (37°06'N, 102°14'E; 海拔3075 m), 柏树落叶层, 2009-08-17, 谢丽霞采。副模5头 (75% 酒精浸泡, QHXNDWY-XLX-2009-8-17), 采集记录同正模。

分布: 中国(青海)。

词源: 新种名源自拉丁词“*dimidia* 一半或对半”及“*spina* 刺”, 意指新种假气门器 (*ss*) 端半部分密被微刺。

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